



Changing flood hazard in the Mekong Delta

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Current or future flood hazard is an indispensable input for flood risk analysis and assessment. In order to address flood hazard, several approaches could be applied depending on the case study. It is now common to state that climate change can lead to changing flood hazard. Starting from this assumption this study aims at developing a novel approach for flood hazard mapping considering the change in climate variability, and applying it for the Mekong Delta. Hydrological data, e.g. precipitation or flow discharges, being the main input for hydrological and hydraulic models, are usually examined using conventional frequency analysis in flood hazard analysis. In this approach stationarity and independence are the fundamental underlying assumptions. However these assumptions remain doubtful because of the change in natural variability, especially in the context of climate change. Thus, this study takes non-stationarity and dependence into consideration in two aspects: First we examine extreme values of peak flow and flood volume of flood hydrographs and their dependency. Secondly we evaluate the dependence of these variables of the monsoon variance, provided by a GCM. Furthermore, a copula is used to generate pairs of maximum discharge and volume, by coupling their marginal distributions to gain a bivariate distribution. Additionally, a cluster analysis is applied to identify and construct typical synthetic flood hydrographs. Finally flood hazard maps for the whole Mekong Delta are computed by a large scale hydrodynamic model of the Mekong Delta, which was automatically calibrated utilizing inundation maps and gauging data through a multi-objective optimization algorithm. To account for the uncertainty in the hazard assessment, a Monte Carlo framework is applied yielding probabilistic hazard maps.